Machine Translation of JP 6-192,479

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to a new rubber constituent especially a bead-filler rubber constituent, and the pneumatic tire using it, and it relates to the pneumatic tire using a bead-filler rubber constituent and it excellent in rate[of high elasticity]-izing (nature rubber of superhard), and the low loss property in more detail, without deteriorating the code of a tire.
[0002]
[Description of the Prior Art] Various examination is made in order that the bead section structure of a radial-ply tire may satisfy the motile ability and endurance ability which are demanded as a tire. Moreover, we are anxious about the global warming phenomenon accompanying the increase in carbon-dioxide emissions in recent years, the cure aiming at a mpg disposition top is required from an automobile and autoparts, and improvement in the mpg performance by reduction of rolling resistance is demanded also from the tire.
[0003] Although the attempt which makes the motile ability of a tire and endurance ability improve by arranging a bead reinforcement layer in the bead section as the cure was made, the manufacturing process of a thing [such] increased and it had the fault that productivity was remarkably inferior.
[0004] Improving motile ability by arranging the nature rubber of superhard in the bead section as other attempts is indicated by JP,47-16084,Y, the French country patent No. 1,260,138, U.S. Pat. No. 4,067,373, etc. However, the function as bead-filler rubber under the complicated input under tire run is fully demonstrated, and it is hardly taken into consideration about giving endurance required as a tire etc. on it.
[0005] moreover, although it is known that the bead-filler rubber constituent excellent in endurance will be obtained if carbon black is used together in the system of natural rubber, a polybutadiene rubber, etc. a novolak type phenol system resin and/or a novolak type denaturation phenol system resin, and a resin curing agent as indicated by JP,57-30856,B, hardening efficiency is bad, and also in order for such technology to blend a resin curing agent with a resin and the kneading object of rubber and to make it harden it in rubber, its resin of a considerable amount will be unreacted and it will
[0006] Then, in order to obtain a desired degree of hardness as bead-filler rubber, it is necessary to make [many] the loadings of a resin or to increase the quantity of a resin curing agent. However, although the desired degree of hardness could be obtained when increasing the loadings of a resin further, the unreacted resin also increased in connection with this, and it had the problem that these unreacted resins reduced a mechanical property, especially the fatigue life and creep nature of a rubber constituent as a mere foreign matter, or febrility became large, and the destructive life of a tire became short. On the other hand, when the quantity of a curing agent, for example, a hexamethylenetetramine, was increased, and the powerful fall by amine degradation of the polyester fiber by which ammonia occurs and is widely used during tire vulcanization and the tire run as a reinforcement code of the adjoining carcass layer took place and especially a tire was vulcanized at an elevated temperature, there was a problem.
[0007] In order to solve this problem, while denaturalizing a novolak type phenol system resin in oil,

such as animal and vegetable oils, by inner-adding a hexamethylenetetramine to this resin as a resin curing agent, and giving self-hardenability to it, reinforcement hardening of rubber is raised, the yield of ammonia is suppressed, and the method of mitigating the powerful fall by amine degradation of a polyester fiber is indicated by JP,2-222432,A. Although the amount of ammonia generated at the time of vulcanization could be suppressed and the improvement in a tire performance was accepted by this method, in order to raise the productivity in vulcanization, when an elevated-temperature short time was vulcanized, ammonia generating depressor effect fell and it also had the fault that a polyester fiber will deteriorate gradually under elevated-temperature vulcanization conditions.

[0008] On the other hand, in order to obtain the rate[of high elasticity]-ized strengthening rubber constituent, blending a staple fiber with the rubber which can be vulcanized is performed conventionally. For example, JP,1-17494,B has the publication of strengthening rubber the nylon fiber which ****(ed) to rubber and it is carrying out [the publication] graft combination through the initial condensate of a resol type alkylphenol formaldehyde system resin. However, by this method, since reactivity was using the high resol type alkylphenol resin to heat, it was difficult, the rubber which can be used was also limited and, moreover, regulation of the graft combination with nylon fiber and rubber was able to obtain only the few strengthening rubber constituent of a nylon content.

[0009] The synthetic rubber which blended the tackifier with JP,3-21572,B in order to solve this was made to distribute the detailed fibrous object of a thermoplastic polyamide, and although the method of carrying out graft combination of this polyamide and the synthetic rubber through novolak type phenol resin in this interface was indicated, by this method, the resin curing agent was blended with the kneading object of rubber, a polyamide, and a resin, and in order to make it harden in rubber, there were the above various problems. Moreover, by kneading aromatic-polyamide pulp and a phenol system resin to rubber, staple-fiber reinforcement and resin reinforcement are performed and it is indicated by JP,3-49932,B that-izing can be carried out [the rate of high elasticity] by these. However, since the rubber molecule and the polyamide pulp staple fiber do not couple directly with this technology The fault in which reinforcement efficiency is low, the staple fiber itself acts on as a destructive nucleus in the inside of rubber further, and the defatigation endurance and creep nature of rubber are reduced remarkably Moreover, in order to distribute pulp-like fiber in rubber using kneading machines, such as a Banbury mixer If the reinforcement effect over the loadings of a staple fiber will fall if distributed level is very low and exceeds a certain amount, and it increases further, it has the fault from which kneading and extrusion become very difficult.

[0010]

[Problem(s) to be Solved by the Invention] As mentioned above, the bead-filler rubber constituent and the pneumatic tire using this have continued till present, yet being unable to solve a problem.

[0011] Offer of a rubber constituent excellent in rate[of high elasticity]-izing (nature rubber of superhard) and the low loss property is the 1st purpose, without this invention deteriorating a tire cord. Furthermore, offer of the pneumatic tire this invention excelled [pneumatic tire] in controllability, low rolling-resistance nature (low mpg nature), and bead-filler endurance using this rubber constituent is the 2nd purpose.

[0012]

[Means for Solving the Problem] The masterbatch rubber to which a rubber constituent according to claim 1 comes to carry out the chemical bond of (1) thermoplasticity polyamide staple fiber and the diene system rubber, As opposed to the diene system rubber 100 weight section in the blend rubber which consists of at least one sort of diene system rubber, and (2) blend rubber The carbon black of 5 - 90 weight section, (3) It is characterized by containing the novolak type denaturation phenol system resin which inner-added the resin curing agent of 2 - 25 weight section to this diene system rubber 100 weight section.

[0013] A rubber constituent according to claim 2 is characterized by the loadings of the aforementioned thermoplastic polyamide staple fiber being 2.5 - 50 weight section to the diene system rubber 100 weight section in blend rubber in a claim 1.

[0014] A rubber constituent according to claim 3 is characterized by the aforementioned novolak type

denaturation phenol system resins being rosin oil, tall oil, a cashew oil, linolic acid, a xylene, a mesitylene, and a resin denaturalized by at least one sort chosen from the nitrile rubber as a modifier in a claim 1.

[0015] A rubber constituent according to claim 4 is characterized by the aforementioned resin curing agent being at least one sort chosen from a hexamethylenetetramine, a paraformaldehyde, a hexamethoxy methyl melamine, an acetaldehyde ammonia, alpha-polyoxymethylene, the multiple-valued methylol melamine derivative, the oxazolidine derivative, and the multiple-valued methylol-ized acetylene urea in a claim 1.

[0016] A rubber constituent according to claim 5 is characterized by the diene system rubber of the aforementioned masterbatch being at least one sort chosen from natural rubber, synthetic polyisoprene rubber, isobutylene isoprene rubber, and ethylene-propylene rubber in a claim 5.

[0017] A pneumatic tire according to claim 6 is characterized by using a rubber constituent according to claim 1 as bead-filler rubber.

[0018] A pneumatic tire according to claim 7 is characterized by the code for carcasses being a polyester fiber in a claim 6.

[0019] This invention persons The property of staple-fiber reinforcement rubber, a phenol system resin, and a resin curing agent, And by combining the staple-fiber reinforcement rubber masterbatch, the carbon black, and the phenol system resin which the rubber molecule and the polyamide combined chemically, as a result of repeating examination wholeheartedly paying attention to such reactivity etc. Without deteriorating a tire cord, it was compatible in rate[of high elasticity]-izing, and the low loss property, and it finds out that the pneumatic tire using extremely excellent a bead-filler rubber constituent and it is obtained, and came to complete this invention.

[0020] The staple-fiber reinforcement rubber masterbatch to which the thermoplastic polyamide currently especially distributed in diene system rubber is considering graft combination etc. as the rubber molecule, With the composition which consists of carbon black and the novolak type denaturation phenol system resin which inner-added the curing agent Hardening reaction efficiency can be raised, generating of ammonia can be suppressed, and the tire excellent in lightweight nature, controllability, low rolling-resistance nature (low mpg nature), and bead-filler endurance can be obtained by using this bead-filler rubber constituent.

[0021] this invention is explained in detail below. In this invention, the blend rubber which consists of a masterbatch which comes to carry out the chemical bond of a thermoplastic polyamide staple fiber and the diene system rubber, and at least one sort of diene system rubber is used, and natural rubber (NR), synthetic polyisoprene rubber (IR), a polybutadiene rubber (BR), a styrene butadiene rubber (SBR), chloroprene rubber (CR), isobutylene isoprene rubber (IIR), a chlorinated butyl rubber (CIIR), a brominated butyl rubber (BIIR), ethylene-propylene rubber (EPDM), etc. are mentioned to the diene system rubber.

[0022] As the aforementioned thermoplastic polyamide, a 200-220-degree C polyamide is used more preferably, for example, the melting point can mention 190-225 degrees C of 190-235 degrees C of nylon, such as nylon 6, Nylon 610, Nylon 12, nylon 611, and Nylon 612, preferably, for example. The amount of this polyamide can be suitably adjusted by kneading diene system rubber further to the polyamide reinforcement rubber which is a masterbatch. Moreover, a thermoplastic polyamide is contained in the form of a staple fiber in the rubber constituent of this invention. the view of the amount of the polyamide as a staple fiber from a physical-properties side and a processing side -- required -- the amount of staple fibers in a rubber constituent -- the diene system rubber 100 weight section in a constituent -- receiving -- 2.5 - 50 weight section -- it is 5 - 30 weight section preferably In under the 2.5 weight sections, if the effect of staple-fiber reinforcement does not show up in the physical properties of a rubber constituent but exceeds 50 weight sections, since kneading and extrusion become difficult, it is not desirable on rubber constituent manufacture.

[0023] Although the thermoplastic polyamide staple fibers in the rubber constituent of this invention should just be a rubber molecule and a certain integrated state, its things combined chemically, such as graft combination, are desirable, for example. The cross section of this staple fiber is circular, a pitch

diameter is 0.05-0.8 micrometers, and the 90 % of the weight or more is 1 micrometer or less, and the fiber length is 10 micrometers or more, and the 90 % of the weight or more of a thing 1000 micrometers or less is desirable.

[0024] the loadings of the carbon black in this invention -- the aforementioned diene system rubber 100 weight section -- receiving -- 5 - 90 weight section -- desirable -- 10 - 70 weight section -- it is 20 - 60 weight section still more preferably under 5 weight sections are inadequate for distributing the phenol system resin of a complement uniformly, although the reinforcement effect is given, and since rubber will become weak and the endurance of a rubber constituent will get worse extremely on the other hand if 90 weight sections are exceeded, it is not desirable

[0025] If it adds about an operation of carbon black, although diene system rubber and a novolak type denaturation phenol system resin will be in a big sea island-like phase separation state by un-dissolving When carbon black is used together to this, by the usual rubber kneading method A resin comes to be distributed by homogeneity in rubber from a big phase separation state to the field near the distributed state of carbon black which is looked at by usual rubber and a usual carbon black system, and the nature rubber constituent excellent in the endurance which was not seen of superhard is obtained by conventional resin reinforcement rubber. It is an element with carbon black indispensable to this invention also from such a meaning.

[0026] As the aforementioned novolak type denaturation phenol system resin, that which denaturalized on the basis of the novolak type phenol-formaldehyde condensate and the novolak type substitution phenol-formaldehyde condensate is contained.

[0027] As a modifier used to the above-mentioned resin, at least one sort can be used in rubber, such as aromatic hydrocarbons, such as oil, such as rosin oil, tall oil, a cashew oil, linolic acid, oleic acid, and a linolenic acid, a xylene, and a mesitylene, and a nitrile rubber. In this, a cashew oil is desirable. the amount of these resins -- all the diene system rubber 100 weight sections in a constituent -- receiving -- 2 - 25 weight section -- it is 5 - 20 weight section preferably The effect in which the amount of a resin added the resin under in 2 weight sections is hardly acquired, and the reinforcement effect cannot be expected. Moreover, it is not desirable in order for a superfluous resin to form a floc, to start phase separation and to reduce the physical properties of a rubber constituent remarkably, if 25 weight sections are exceeded.

[0028] As a resin curing agent inner-added, the formaldehyde donator which generates formaldehyde by heating is used for the aforementioned novolak type denaturation phenol system resin. For example, a hexamethylenetetramine, a paraformaldehyde, a hexamethoxy methyl melamine, an acetaldehyde ammonia, alpha-polyoxymethylene, a multiple-valued methylol melamine derivative, an oxazolidine derivative, a multiple-valued methylol-ized acetylene urea, etc. are mentioned, and a hexamethylenetetramine and a hexamethoxy methyl melamine are used suitably. It is a hexamethoxy methyl melamine especially preferably.

[0029] Moreover, the tackifier which has the effect of adhesion grant to the diene system rubber which is a masterbatch with the aforementioned polyamide staple fiber may be added in this system, and it excels in compatibility to the aforementioned diene system rubber as a tackifier, and reactivity can be very low and non-reactivity, or diene system rubber and the thing which does not react substantially can be used depending on heating. For example, rosin derivatives and such mixture, such as petroleum system hydrocarbon resins, such as non-reactivity phenol formaldehyde resins, such as cumarone resin, such as a cumarone indene resin, and non-reactivity phenol resin, an alkylphenol acetylene resin, terpene phenol resin, a polyterpene resin, a hydrocarbon system adhesion-ized resin, and a polybutene, and resin acid zinc, can be mentioned.

[0030] Next, the manufacture method of the rubber constituent in this invention is described. The material used here and its amount are as having described above. If diene system rubber, a thermoplastic polyamide, and a tackifier (accepting the need) are kneaded and extruded at the melting point -270 degree C temperature of a thermoplastic polyamide and it next rolls round, although a staple-fiber reinforcement rubber masterbatch will be obtained, you may roll out or extend this below by the melting point of a thermoplastic polyamide after that.

[0031] Furthermore, since the polyamide-fiber loadings in a compound are adjusted in the amount of the purposes to the obtained masterbatch (what reinforced diene system rubber with the thermoplastic polyamide-fiber-like object by graft combination), diene system rubber can be added suitably, compounds, such as a this, carbon black, and novolak type denaturation phenol system resin which inner-added the resin curing agent, can be kneaded in a Banbury mixer, and the target rubber constituent can be obtained.
[0032] In this invention, you may add suitably bulking agents other than the sulfur usually used in rubber industry besides the above, a vulcanizing agent, a vulcanization accelerator, an antioxidant, and carbon black (for example, a silica etc.), a process oil, etc.
[0033] dynamic-modulus E' in the direction of orientation of a polyamide staple fiber if the vulcanizate physical properties of the rubber constituent of this invention are described here -- 20.0x108 tandelta [in / a perpendicular direction / to this direction of orientation / it is above and] -- 0.20 or less -- it is -- further -- the ratio of E'p of this direction of orientation, and vertical E'v -- it is desirable that E'p/E'v is 1.5 / 1 - 3.0/1 in the viewpoint which improves a tire performance further
[0034] Since the rubber constituent of this invention is excellent in rate[of high elasticity]-izing (nature rubber of superhard), and the low loss property, if this is used as bead-filler rubber for tires, the pneumatic tire excellent in lightweight nature, driving stability, low rolling-resistance nature (low mpg nature), and bead-filler endurance will be obtained. Especially this feature is remarkable in the pneumatic tire which uses a polyester fiber as a reinforcement code of a carcass layer. This rubber constituent can be used suitable for the product for belt reinforcement, for example, the object etc., etc. which requires nature rubber of superhard other than a tire.
[0035]
[Example] Although an example is given to below and this invention is more concretely explained to it, unless the main point of this invention is exceeded, it is not limited to this example.
[0036] In this invention, the following were used about the staple-fiber reinforcement masterbatch and the addition novolak type oil denaturation phenol system resin in a resin curing agent.
1. Staple-Fiber Reinforcement Masterbatch UBE-FRR-NR[Tradename : Ube Industries, Ltd.] Combination Natural rubber 100 weight sections 6-nylon 1 50 weight sections tackifier 2 The 2 weight section 1 melting point: The loadings of a polyamide (6-nylon) can be suitably adjusted by kneading with the diene system rubber of the others [masterbatch / this] in a Banbury mixer which is 221 degrees C and molecular weight:3x1042 non-reactivity phenol-formaldehyde resin.
2. The synthetic example was shown in the addition novolak type oil denaturation phenol system resin following in a curing agent.
[0037] [Synthetic example 1] The temperature up of the contents was carried out to 95 degrees C, teaching and stirring 200g [of novolak type phenol system resins] (80 degrees C of melting points), 150g [of water], and gum arabic 4g which denaturalized from cashew oil in a 1l. glass flask. It reacted by applying for 15 minutes and holding solution temperature at 95 degrees C, having added to this the liquid which dissolved hexamethylenetetramine 20g in 150g of water, and stirring it. Next, after making contents fall to 30 degrees C and adding 500g water, by filtration through a filter paper, it washed in cold water by having separated solid-liquid and the resin particle was obtained. 35 degrees C and dryness of 24 hours were performed under reduced pressure (5 or less mmHgs) of this resin, and Resin A was obtained as an addition novolak type denaturation phenol system resin particle in a resin curing agent.
[0038] [Synthetic example 2] Instead of the hexamethylenetetramine, Resin B was obtained like the synthetic example 1 as an addition novolak type denaturation phenol system resin particle in a resin curing agent except having used the hexamethoxy methyl melamine.
[0039] [Examples 1-6 and examples 1-5 of comparison] The various rubber constituents by the content of combination shown in Table 1 were created, and the powerful retention (influence on a polyester-fiber code) of dynamic-modulus E', dynamic-loss coefficient tandelta, and a polyethylene terephthalate (PET) was measured. The result was shown in Table 2.
[0040] next, it accumulating and with the steel code layer of two plies as the tire for which the effect to a

tire is examined and which is shown in drawing 1 , i.e., a belt layer In the sample offering pneumatic tire 10 which is a tire of size 165SR13 equipped with one ply of the layer which consists of PET fiber of 1500d/2 as a carcass layer, and stopped the clinch of a carcass ply in the low position near the rim flange The tire which made the direction 16 of orientation of a staple fiber parallel to bead wires 12 as a rubber constituent of a bead filler 14 using the compound of the examples 1-6 shown in Table 1 and the examples 1-5 of comparison was created, and rolling-resistance nature (RR), controllability, and the special durable drum examination (PET powerful retention) were performed. The result was shown in Table 2.

[0041] In addition, various kinds of evaluation methods are as follows.

(1) It measured at the room temperature according to 1% of dynamic distortion by dynamic-modulus E' and the state where it was made to elongate 5% statically using the viscoelasticity spectrometer (VES-F type) of a dynamic-loss coefficient tandelta Iwamoto factory 2mm in test piece thickness, width of face of 4.7mm, and a length of 20mm, and conditions with a frequency of 50Hz.

(2) in order to consider the influence on a PET powerful retention polyester-fiber code -- a PET fiber code -- the inside of a rubber constituent -- laying underground -- 160-degree-C conditions for 90 minutes -- after vulcanization and a code -- taking out -- the code strong force -- measuring -- the code of original (before vulcanization) -- it contrasted that it was powerful and asked for PET powerful retention

(3) Controllability (cornering power (CP) index)

It is internal pressure 2.0 kg/cm2 to drum lifting with an outer diameter of 3000mm. After installing the sample offering tire with which it was filled up and carrying out the load of the load 300kgf, a preliminary run is carried out for 30 minutes at the rate of 30 km/h. by unladen Internal pressure 2.0 kg/cm2 It readjusted and the load of the load of 300kgf(s) was carried out again, by the aforementioned drum lifting of the same diameter, a maximum of **14 degrees carried out positive/negative continuation, the slip angle was attached, the cornering force (CF) in positive/negative each angle was measured, and the cornering power (CP) was decided by the following formula. Controllability is expressed with CP index to a control tire (example 1 of comparison), and judges that the one where an index is larger is good.

[0042] CP(kg/deg) ={CF(1 degree)+CF(2 degrees)/2+CF(3 degrees)/3+CF (4 degrees) / 4} / 4(4) rolling-resistance index (RRC index)

It is internal pressure 2.0 kg/cm2 to drum lifting with an outer diameter of 1708mm. After having carried out the preliminary run for 30 minutes at the rate of 80 km/h, having readjusted pneumatic pressure, after installing the sample offering tire with which it was filled up and carrying out the load of the load 300kgf, and raising drum rotational speed to the speed of 200 km/h, the drum was made to coast and it computed from moment of inertia until drum rotational speed falls from 185 km/h to 20 km/h.

[0043] (Rolling resistance of a tire) = [-ds/dt(Id/Rd2+It/Rt2)- (resistance of a drum simple substance)] For Id, the moment of inertia of a drum and It are [a drum radius and Rt of the moment of inertia of a tire and Rd] tire radii among a formula.

[0044] The rolling-resistance value at the time of 50 km/h calculated by the above-mentioned formula was calculated as central value. In addition, measurement was carried out in the interior of a room controlled by 24**2 degrees C. Indexation rounded off and expressed below decimal point of the value of the following formula.

[0045] (Rolling-resistance index) It will be shown that the one where =[(test tire central value)/(control tire central value)] x100, consequently a rolling-resistance index are smaller is good mpg nature.

[0046] The loads at the time of measurement of a rolling-resistance index are 300kgf(s), and the measuring method of a rolling-resistance index is a 1 shaft coasting formula.

(5) When the PET powerful retention tire in a special durable drum examination and a tire was constructed to 41 / 2 J rim, mileage until it is stuck to metal drum lifting with a diameter of 17m by pressure on condition that an over load from which the strain energy concentrated on the clinch edge of a carcass ply becomes about 4 times at the time of a real vehicle usual run, and fault internal pressure, it makes it run at the rate of 60 km/h and failure occurs at the carcass ply clinch edge showed it and it ran

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the tire to 30000km moreover, the tire at that time to the PET code -- taking out -- the code strong force -- measuring -- the level before and behind a run -- an original code -- it contrasted that it was powerful and asked for PET powerful retention

[0047]

[Table 1]

	実施例						比較例				
	1	2	3	4	5	6	1	2	3	4	5
天然ゴム	80	40	15	40	0	40	100	75	100	75	40
SBR	—	—	25	—	—	—	—	25	—	25	—
FRR−NR (短繊維量)	30 (10)	90 (30)	90 (30)	90 (30)	150 (49)	90 (30)	—	—	—	—	90 (30)
カーボンブラック[1]	50	←	←	←	←	←	80	←	←	←	←
プロセスオイル	10	←	←	←	←	←	10	←	←	←	←
酸化亜鉛	5	←	←	←	←	←	5	←	←	←	←
老化防止剤[2]	1.5	←	←	←	←	←	1.5	←	←	←	←
加硫促進剤[3]	1	←	←	←	←	←	1	←	←	←	←
硫黄	5	←	←	←	←	←	5	←	←	←	←
ステアリン酸	2.5	←	←	←	←	←	2.5	←	←	←	←
ヘキサメチレンテトラミン	—	—	—	—	—	—	5	3	←	←	←
ノボラック型フェノール樹脂	—	—	—	—	—	—	25	15	←	←	←
樹脂A（合成例1）	15	10	10	20	10	—	—	—	25	15	—
樹脂B（合成例2）	—	—	—	—	—	20	—	—	—	—	—

1) HAF
2) ノクラック6C
3) ノクセラーHSA

[0048]

[Table 2]

	実施例						比較例				
	1	2	3	4	5	6	1	2	3	4	5
ゴム組成物物性											
E' (×10⁸ dyn/cm²)							13.1	13.9	13.8	14.3	
繊維配向方向*)	20.0	27.0	27.7	32.1	38.0	34.5					15.0
繊維配向垂直方向*)	10.5	12.0	12.5	13.1	16.1	13.2					8.3
tanδ							0.210	0.202	0.209	0.207	
繊維配向方向*)	0.26	0.310	0.311	0.322	0.351	0.320					0.300
繊維配向垂直方向*)	0.110	0.125	0.130	0.145	0.170	0.124					0.210
PET強力保持率(%)	85	90	90	84	90	100	78	81	83	85	100
タイヤ性能											
操縦性CP指数	102	103	103	105	106	106	100	101	101	101	96
RRC指数	90	91	92	94	96	91	100	100	100	100	96
PET強力保持率(%)											
3万km走行前	93	96	96	92	96	100	90	90	91	93	100
3万km走行後	89	92	92	87	92	97	72	81	84	89	96

*) ポリアミド短繊維の配向に対する方向性

[0049] Compared with the example of comparison, the rubber constituent of this invention satisfies simultaneously a high dynamic modulus and a low dynamic-loss coefficient, and is understood that the

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influence on [from the value of PET powerful retention] a polyester-fiber code is also good so that clearly from Table 2. It is shown that this is the well-balanced rubber constituent excellent in the rate of high elasticity and the low loss property, i.e., low mpg nature etc. moreover, the tire using the rubber constituent of this invention as bead-filler rubber -- Table 2 -- since -- it turns out that it excelled in low rolling-resistance nature, i.e., low mpg nature, and controllability was moreover raised, and the bead-filler endurance by PET degradation is also satisfied so that it may understand

[0050]

[Effect of the Invention] since the rubber constituent of this invention was considered as the above-mentioned composition, it has the effect excellent in rate[of high elasticity]-izing, and the low loss property, without deteriorating a tire cord, and the pneumatic tire using this rubber constituent was excellent in controllability, low rolling-resistance nature (low mpg nature), and bead-filler endurance -- it has an effect

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[Translation done.]